Sustainable Sanitation And Water Management

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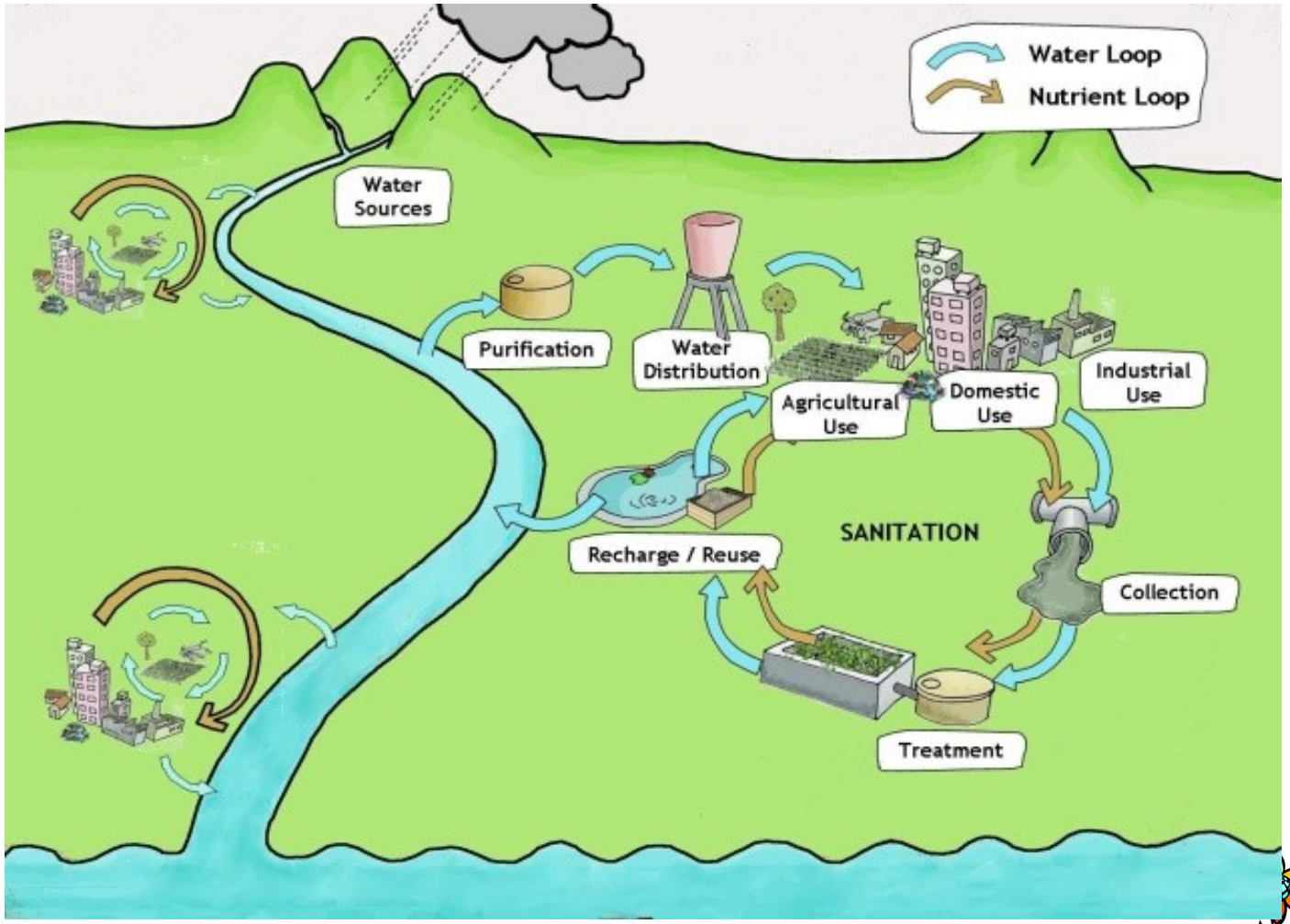
1. Definition of Sustainable Sanitation

- **Reuse** of all **valuable** matter available in



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2. Methodology for SSWM

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3.1 Safe Drinking Water Source

At least 1 source inside the school premise, irrespective of whether there is another one outside of near the school campus.

Can you identify some of the sources of water?

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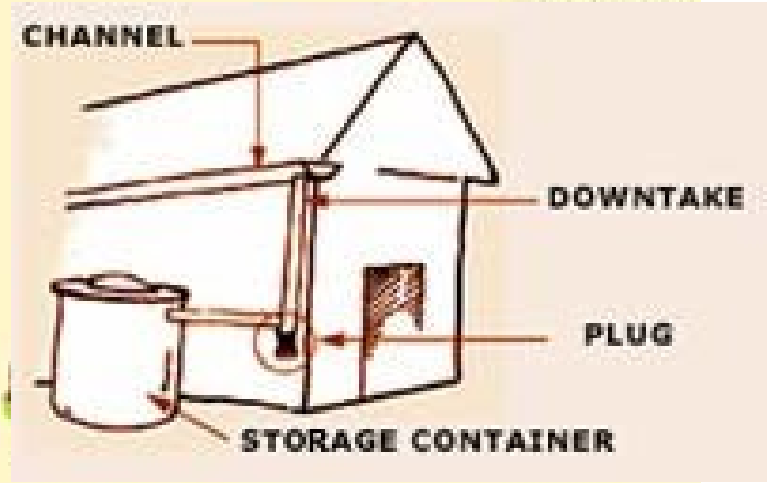
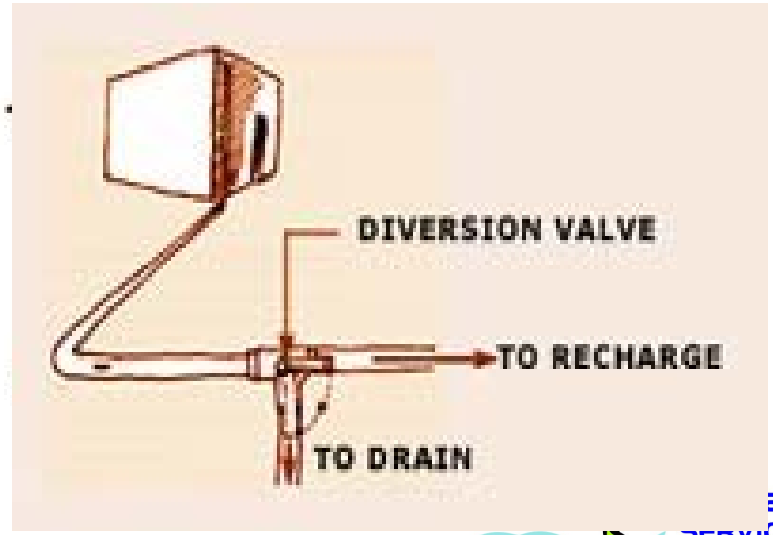
3.1.1 Rain Water Harvesting (RWH)

Components of RWH

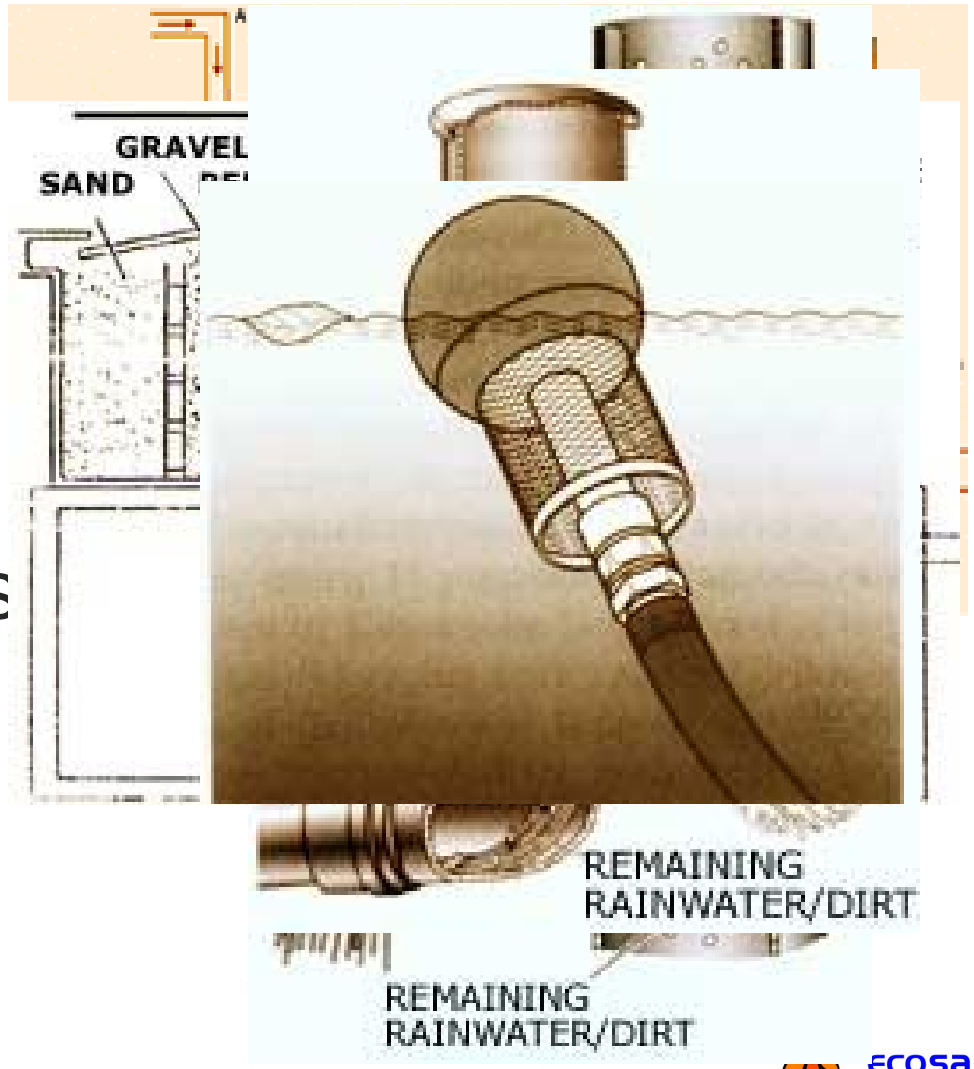
- Catchment
- Coarse mesh
- Gutters
- Conduits
- First Flushing Device
- Filters
- Storage Facilities
- Recharge Structures





Filters for RWH

1. Charcoal Filter
2. Sand Filters
    1. DEWAS Filter
    2. Barrel type
3. Advanced Filters



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3.2 Water Storage Tanks

Minimum of 500 liters for every 100 children including buffer reserve. At least 5 liters per child to be provided.

Can you name some type of storage options found in schools?

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3.3 Use Of Water In School

Water Consumption

3.3.1 Use Of Water In School: Toilets & Its Types

Different types of urine diversion flush toilets. Source: dubbletten.nu; gustavsberg.com; stman.se; rroevac.de

Urine Diversion Pour Flush Toilets

Pour Flush Toilets

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3.3.2 Use of Water: Water Conserving Measures

With a toilet dual flush button, users have the possibility to choose between two volumes either for solids or for liquids. Source: ROUS WATER (2011)

California, uses approximately 4.8 litres of water per flush. Source: PIPLINE (2000)

Low Flush Toilets

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Urinals

Which component in “The Toilet Block” stinks t whv?

Hydrolysis of Urea

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3.3.2 Use of Water: Water Conserving Measures

Various designs of water-less urinals.
ce: caroma.com, franke.com, urimat.com, waterless.c

Water less Urinals

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3.4 Collection

- Segregation at the source
- Grey water, Urine & Black water

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3.5.1 Treatment

Grey Water

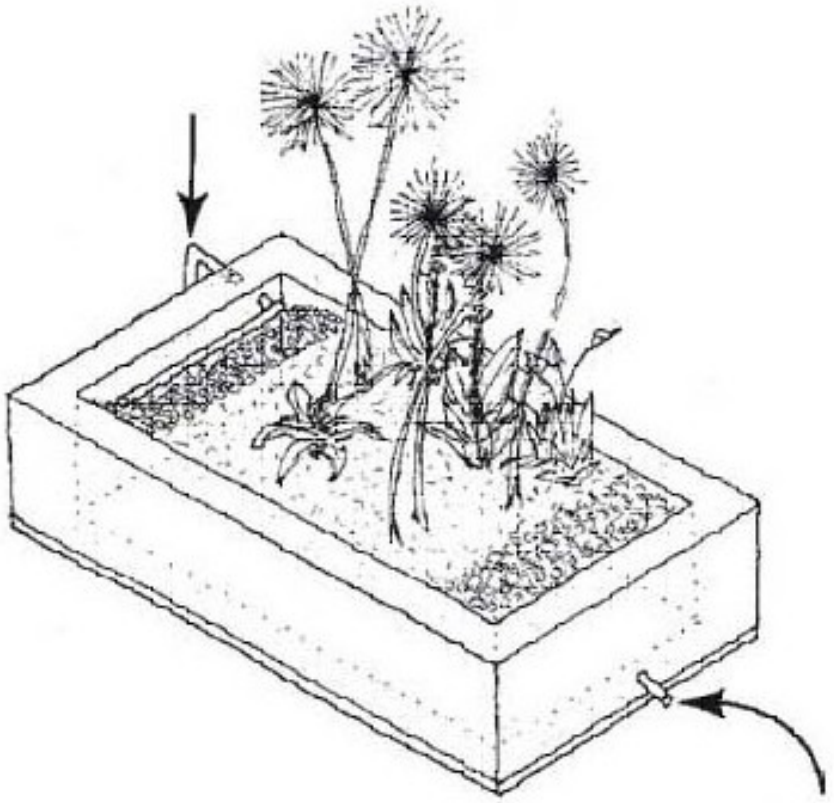
Evaporati

•Alternative olution.

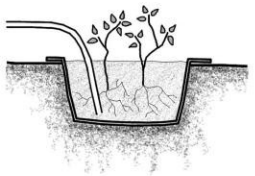
•Effluents sealed up

receptacle evaporates

from the s the p



A variety of evaporation bed designs are available and the exact design and measurements depend on the amount and the kind of wastewater to be treated. Source: ECOSAN UE (2007)



3.5.2 Treatment: Grey Water

Grey water Towers

Feeding a greywater tower.
Source: SHEWA et al. (2009)

Step-by-step instru

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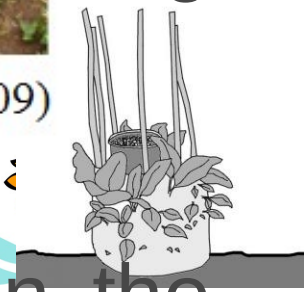
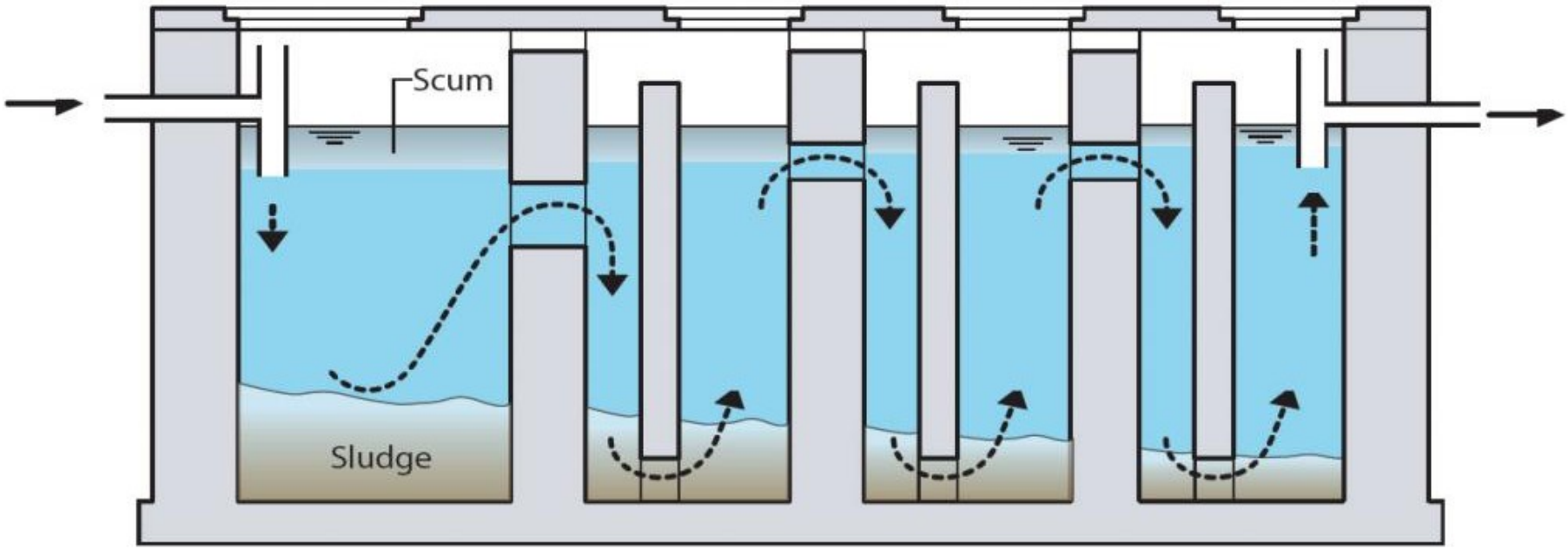
l. (2009)



- Vegetables are planted in holes cut in the

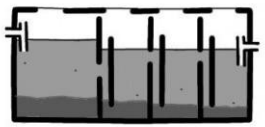
3.5.3 Treatment: Black Water

Onsite Treatment System: Anaerobic Baffle Reactor



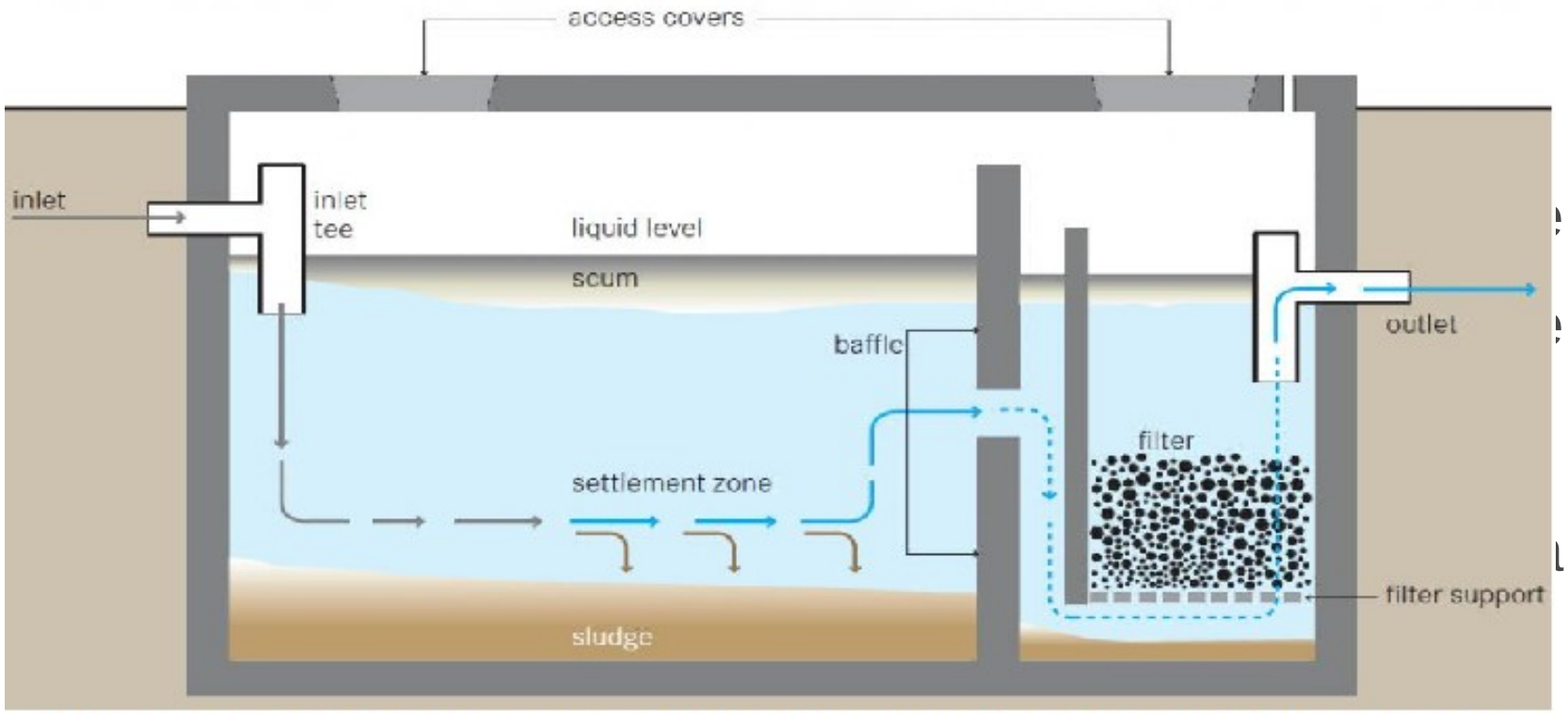
Schematic cross-section of an up-flow anaerobic baffled reactor (ABR). Source: MOREL & DIENER (2006)

A combination of the principles of septic tanks, bed reactors and up-flow anaerobic sludge reactors.



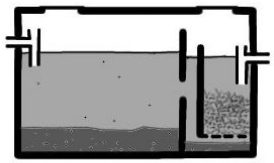
3.5.4 Treatment: Black Water

Onsite Treatment System: Anaerobic Up Flow Filter



Simple one unit anaerobic Filter integrated in the second chamber of a septic tank. Gas is evacuated by the venting opening at the upper right. Source: TILLEY et al. (2008)

bacteria to settle.

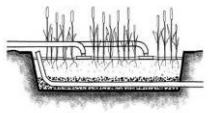


3.5.5 Treatment: Black Water

Onsite Treatment System: Constructed Wetlands

Left: Vertical flow filter during construction in Brazil (lined with polythene liner), drains are being covered with gravel.
Right: Vertical flows filter in Peru during filling with sand.
Source: HOFFMANN et al. (2010)

- Water slowly flows through the we



3.6.1 Reuse: Surface Groundwater Recharge

Groundwater recharge in trenches. Source: BATES (2004)

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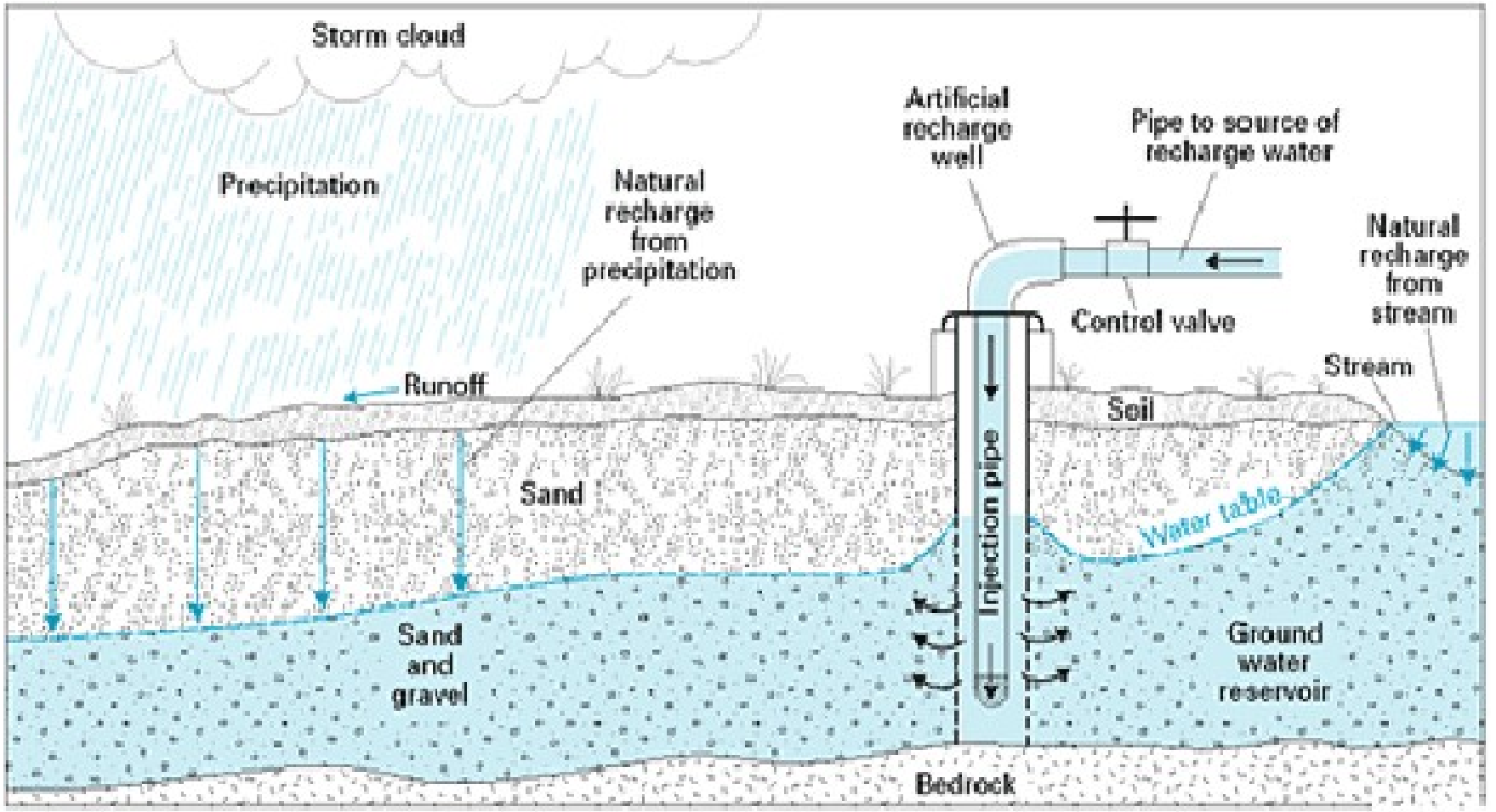
3.6.2 Reuse: Subsurface Groundwater Recharge



Artificial recharge via an injection pipe. Source: USGS (2011)

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Ideal Sustainable School

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Thank You

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